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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,454	10/02/2003	Sion M. Pickard	7000Z	8506

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EXAMINER	
MAI, NGOCLAN THI	
ART UNIT	**PAPER NUMBER**
1742	

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/677,454	**Applicant(s)** PICKARD ET AL.	
	Examiner Ngoclan T. Mai	**Art Unit** 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 December 2004*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-139* is/are pending in the application.
4a) Of the above claim(s) *See Continuation Sheet* is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *See Continuation Sheet* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims withdrawn from consideration are 4-16,21-38,40,46-50,59-66,82-89,97-106,109,110,113,114,117,123,124,127,128,131 and 136-139.

Continuation of Disposition of Claims: Claims rejected are 1-3,17-20,39,41-45,51-58,67-81,90-96,107,108,111,112,115,116,118-122,125,126,130 and 132-135.

DETAILED ACTION

1. Applicant's election without traverse of group I, claims 1-4, 17-20, 39, 41-45, 51-96 and 107-135 in the reply filed on December 10, 2004 is acknowledged. Applicant further elected species (i) directed to the composite wherein the metal matrix is aluminum. Accordingly claims, readable on the elected species, are 1-3, 17-20, 39, 41-45, 51-58, 67-81, 90-96, 107-108, 111-112, 115-116, 118-122, 125, 126, 129-130, and 132-135.

2. Claims 4-16, 21-38, 40, 46-50, 59-66, 82-89, 97-106, 109-110, 113-114, 117, 123-124, 127-128, 131, 136-139 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention and species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on December 10, 2004.

3. Applicant is advised that should claims 108, 118, 122, and 132 be found allowable, claims 112, 119, 126 and 133-134 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two or more claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 70, 67-69, 90-92 and 120 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 70 recites the broad recitation 50-150 microns, and the claim also recites 100-120 microns, which is the narrower statement of the range/limitation.

Claims 67-69 are indefinite because it is unclear as to what is CVR stand for.

Claims 90-92 recites the limitation "CVR SiC coated diamond powder" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 120, drawn to an electronic package, does not further limit its parent claim, which is drawn to a composite.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Yu et al. (US 4,643,741).

Yu discloses the claimed array of diamond particles comprising diamond crystals covered by beta-silicon carbide formed by subjecting a mixture of pretreated diamond crystals with silicon powder to high pressure and temperature for a period of time. Since SiC is formed from the chemical reaction between diamond crystal and silicon, the carbon of the SiC is expected to be derived from the diamond.

8. Claims 1-3, 17-20, 39, 41-45, 51-58, 67, 70-81, 90, 93-96, 107-108, 111-112, 120-122, and 125-126 are rejected under 35 U.S.C. 102(e) as being anticipated by Miyamoto et al (US 6,673,439 B1).

Miyamoto discloses a composite material comprising SiC coated diamond particles dispersed in aluminum matrix, wherein the SiC coating is formed by chemical reacting SiO gas with carbon supplied from the diamond to form β-SiC coating having thickness of 0.001 to 0.3 μm. See Example 3, col. 8, line 65 to col. 9, line 7, and col. 4, lines 41-46 and 56-65. Note the β-SiC coating reads on the claimed layer of β-SiC chemically bonded to the surface (diamond particle) thereof.

Regarding claims 18, 70-73 and 93-96: Miyamoto teaches employing diamond powder having mean particle diameter desirably 0.5 to 1500 microns, see col. 5, line 63 to col. 6, line 8.

Regarding claims 39, 41-45, 74-81 and 90-96: while the surface coating of the diamond in the composite taught by Miyamoto is not formed by heating a preform of Si powder and diamond powder plus binder, the composite taught contains the all of the claimed materials, thus anticipates the claimed composite. Note that it has been established that a product by process claim is directed to the product per se, no matter how actually made, *In re Kirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964 (CAFC 1985), which makes it clear that it is the patentability of the final product per se which must be determined in a product by process claim and not the patentability of the process. An old or obvious product produced by a new method is not patentable as a product, whether claimed in a product by process claims or not. The applicant has the burden of proof in such case.

Regarding the thermal conductivity limitations in claims 51-54 and 74-77, it appears the claimed property is material property. Consequently, the properties as recited in the instant claims would have inherently possessed by the teachings of the cited references. Therefore, the burden is on the applicant to prove that the product of the prior art does not necessarily or inherently possess characteristics attributed to the claimed product. In re Spade, 911 F.2d 705, 708, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990), In re Best, 195 USPQ 430 and MPEP § 2112.01.

Regarding claims 67 and 90: Miyamoto teaches employing 40 vol. % SiC coated diamond particle for the composite material. See example 3.

With respect to the intended "for LDMOS electronic packages" claimed in claims 107-108, 111-112, 121-122, 125-126 that the claimed intended use of the claimed composite material does not lend patentability to the composite material. A mere statement of a new use for an otherwise old or obvious composition cannot render a claim to the composition patentable. See In re Lemin, 51 CCPA 942, 326 F.2d 437, 140 USPQ 273 (1964), In re Thuau 135 F.2d 344, 57 USPQ 324 (CCPA 1943), Ex parte Douros 163 USPQ 667 (POBA), and In re Craige, 188 F.2d 505, 89 USPQ 393 (CCPA 1951). Furthermore, the claimed properties are mere material properties which would have been inherently possessed by the materials of cited references. See In re Best, 195 USPQ 430 and MPEP § 2112.01.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 68-69 and 91-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al in view of McCoy et al.

Miyamoto discloses a composite material for use as a heat sink in electronic industry substantially as claimed.

The difference between the claims and Miyamoto is that Miyamoto does not specifically teach employing the claimed amount of SiC coated diamond powder in the composite.

However it is known in the electronic packaging art that a substrate for use as heat sink must have unique combination of high thermal conductivity, low thermal expansion, as well as an electrical connection to the electronic device. See McCoy, abstract. McCoy teaches that such unique combination of properties is depended on the loading fraction of the diamonds (the volume ratio of metal matrix to diamond), see col. 3, lines 14-22. McCoy also teaches that diamond has extremely high heat conductivity and low thermal expansion, see col. 4, lines 2-9. Although the claimed amount of SiC coated diamond in the composite is not taught by neither references, such would not be a patentable difference since it would be an obvious modification to increase the amount of SiC coated diamond in the composite in the composite substrate taught by Miyamoto in view of McCoy if higher thermal conductivity and lower thermal expansion for the substrate is desired. Hence the difference would appears to no more than routine optimization of the amount SiC coated diamond used, which is well within the skill of the artisan and productive of no new and unexpected results.

11. Claims 115-116, 118-119, 129-130, 132, 133, and 134 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCoy (US patent 6,727,117 B1) in view of Miyamoto et al. (US patent 6,673,439 B1)

McCoy teaches a semiconductor package of the LDMOS type having a metallic substrate with a die comprising semiconductor device, i.e., chip, mounted directly thereon. The metallic substrate is formed of a highly thermal conductive material such as SiC coated diamond particles in a metal matrix, see McCoy, col. 2, line 58 to col. 3, line 26 and col. 4, lines 29-51. McCoy teaches that the substrate functions to remove heat from the semiconductor package. See col. 3, lines 6-13.

The difference between the claims and McCoy is that McCoy does not specifically teach employing substrate formed of SiC coated diamond particles in aluminum matrix.

Miyamoto teaches a composite material formed of SiC coated diamond particles in aluminum matrix having high thermal conductivity and for use as a heat sink material in electronic industry.

Since the claimed composite substrate is conventionally known for use as heat sink in electronic industry as taught by Miyamoto, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the composite substrate taught McCoy with the known composite taught by Miyamoto for the same purpose.

12. Claim 135 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anschel et al. (US 4,914,551) in view of Miyamoto et al.

Anschel teaches an electronic package employing a heat spreader **37** interposed between the package's semiconductor device **17** (e.g., silicon chip) and heat sink components **33** for providing an enhance heat path from the semiconductor device to the heat sink. See col. 1, lines 32-39 and 54-65. The heat spreader **37** taught can be silicon carbide, aluminum nitride or metallic material, see col. 3, lines 46-49. The difference between Anschel is that Anschel does not teach employing heat sink formed of the claimed composite material.

Miyamoto teaches the claimed composite material having high thermal conductivity that can be used for electronic material such as heat sink material. See col. 9, lines 13-16.

It would have been obvious to one of ordinary skilled in the art at the time the invention was made to employ the composite material taught by Miyamoto as a heat sink in the electronic package taught by Anschel since employing such highly thermal conductive composite material would further enhance the removing of heat from the semiconductor device.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoclan T. Mai whose telephone number is (571) 272-1246. The examiner can normally be reached on 9:30-6:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ngoclan T. Mai
Primary Examiner
Art Unit 1742

n.m.